

# Shale: The next energy game changer

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After eking out a living for decades with a beef cattle operation on the rugged border of Pennsylvania and New York state, Fran Westcott has hit the jackpot.

In the oil industry equivalent to a claims rush, energy companies have been flooding into this long-depressed patch of rural Appalachia to tie up land in the gas-rich Marcellus shale. Last year, Mrs. Westcott signed a lease with Calgary-based Talisman Energy Inc. that will allow the company to drill for gas on the 210-hectare parcel in northern Pennsylvania where she grew up and her daughter now raises horses.

She reaped a \$489,000 (U.S.) initial payment, plus the promise of future royalties.

But the 65-year-old farmer has yet to cash in on her 371-hectare property in neighbouring New York state, where she has lived for the past 12 years with her husband. Regulations in that state prevent energy companies from employing the technology they need to unlock the natural gas trapped in the shale rock thousands of metres below the surface.

Companies rely upon a drilling technique known as hydraulic fracturing that shoots chemical-laced water deep underground to crack open the shale rock so the gas can escape. They must then dispose of waste water that flows back up the wells.

Echoing concerns from residents across the region, Ms. Westcott fears that hydraulic fracturing will taint the aquifers that feed local water wells. “I am really concerned about the water – I think it’s got to have an effect on the water when you start drilling like they’re doing in Pennsylvania,” she said. “I don’t know how something is not going to happen because they have to go down through the aquifer.”

The recent shale gas boom has been called a “game changer” in the North American energy picture. It promises to deliver abundant, cheap natural gas for decades to come. Utility companies are counting on it to generate electricity with half the greenhouse emissions of coal, while gas producers are touting it as the truck fuel of the future.

But energy companies will have to assuage the worries of voters like Ms. Westcott if they want to capitalize on shale gas’s enormous potential. In New York and Pennsylvania, rural residents are struggling to figure out if the appeal of immediate cash and new jobs from the drilling boom is adequate compensation for the potential environmental effects of hydraulic fracturing.

The residents – and their elected representatives – are also grappling with the sudden industrialization of their communities. Many are demanding tougher environmental regulations and higher taxes that could slam the brakes on the development of a major new source of energy.

In Pennsylvania, where drilling activity is proceeding at a frenetic pace, some landowners and environmental groups are asking regulators to impose tougher rules to protect local ecosystems, while state politicians are considering levying a tax on shale gas transported out of the state.

New York is watching the boom from the sidelines while state officials review regulations that prevent high-impact drilling. Last month, the regulators declared off limits the Catskills area, which also serves as a watershed for [New York City](#). The city – which draws its unfiltered drinking water from reservoirs in the region – had aggressively opposed drilling there.

The industry's biggest concern is that Democrats in the U.S. Congress will force the Environmental Protection Agency (EPA) to step in where state regulations currently prevail. The EPA has already launched a study on the impact of horizontal drilling and hydraulic fracturing on local aquifers, saying there is a "lack of scientific information" to verify anecdotal complaints about groundwater contamination.

"If the federal regulator decided it is going to step in to regulate the development of shale resources, it would put a huge brake on the pace of shale resources development within North America," Paul Smith, Talisman's executive vice-president for North America, said in an interview.

Talisman is spending \$1-billion this year to drill the Marcellus shale in Pennsylvania and insists it can extract the gas without causing environmental damage, while providing much-needed jobs and tax revenues to the recession-battered state.

### **Prolific Pennsylvania**

Pennsylvania is expected to produce four billion cubic feet a day of gas by 2015, according to Ziff Energy of Calgary. The total output could rise as high as eight billion cubic feet by 2020, according to a new study from Pennsylvania State University. That's more gas than would be delivered through the Alaska and Mackenzie Valley pipelines combined.

And Pennsylvania's output is just part of the reserves locked up in the Marcellus deposit. It is a prolific monster, stretching from West Virginia to the doorstep of New York City, and has the potential to rearrange the continent's energy flow.

Marcellus gas could mean low-cost competition for Canadian gas producers in their traditional markets of Ontario and the northeastern United States. Last week, Norway's state-owned

Statoil SA announced a deal to reverse an export pipeline from Canada and deliver Marcellus gas into the Ontario market, starting in 2012.

Along with Range Resources Corp. and Chesapeake Energy Corp., Talisman has become one of the dominant players in the Marcellus after shifting its strategy away from conventional gas production in Western Canada. It plans to drill more than 170 wells in Pennsylvania this year, and boost production to 300 million cubic feet a day by the end of the year from zero in 2008.

But political opposition is the wild card in this game. If the U.S. state and federal governments impose onerous regulations on companies like Talisman, it will be because of problems like that experienced in Dimock, Pa.

Nestled in the eastern Appalachians of Susquehanna County, the picturesque village has become ground zero in the environmental battle over the Marcellus deposit. At nearby town hall meetings, the experiences of Dimock residents like Victoria Switzer are inevitably recounted when communities debate the Marcellus drilling boom.

Down a once-secluded, rural road, Ms. Switzer and her husband spent five years building their dream home: a stunning, open-concept chalet.

But the dream turned sour a few years ago when Houston-based Cabot Oil and Gas Corp. began drilling for natural gas in the neighbourhood. Suddenly, Ms. Switzer and her neighbours began noticing a gaseous smell to their well water. They could literally light their methane-tainted water on fire.

The 57-year-old, retired school teacher now relies on bottled water and hosts tours of her rural neighbourhood to national media and local politicians. “We need to hit the pause button and stop the drilling,” she said. “We have been invaded here – it’s an occupation. We are witnessing the industrialization of rural Appalachia and no one is ready for it.”

While Ms. Switzer and her neighbours are suing Cabot over the well water contamination, the state Department of Environmental Protection (DEP) earlier this month took its own action. It fined the company and ordered it to plug four wells and halt its Dimock drilling because it had failed to halt migrating gas from its wells that contaminated the drinking water of 14 homes in the area.

Both the industry and the DEP say the well contamination in Dimock is neither directly related to hydraulic fracturing nor typical of industry practices. The DEP says Cabot was guilty of shoddy well construction, which allowed methane to migrate from the well site into the ground water. And it says the company failed to deal with the problem, which had been identified in 2009.

Still, environmental activists cite the Dimock experience as evidence of the dangers of intensive gas drilling, which employs a cocktail of toxic chemicals, albeit in highly diluted concoctions.

Their suspicions are heightened because companies don't have to divulge what chemicals they are using.

"Clearly, it hasn't been going safely," said Roger Downs, an Albany-based researcher with the Sierra Club. "We watched what's been going on across the border in Pennsylvania and find they are regulating as they drill rather than beforehand ... A lot of the drilling happens in rural districts where you don't have the scrutiny that you might otherwise have."

### **Drilling technology**

The oil industry notes that companies have long been using hydraulic fracturing techniques in western states and Canadian provinces, with few complaints and no solid evidence that the fluids used to crack open the rock at high pressures have ever migrated to ground water.

"Hydraulic fracturing has been going on in this country for 60 years. It is not new and there have been no confirmed cases of groundwater impacts from hydraulic fracturing," said Kathryn Klaber, president of the Marcellus Shale Coalition, a Pennsylvania-based industry group.

The EPA has studied the drilling technology at least twice before and found no evidence it threatened local water supplies. Critics, however, say the EPA has not looked at cases of intensive drilling, such is now occurring in the shale plays.

The Sierra Club's Mr. Downs said the industry is so poorly regulated that there is little data on the state of water tables before and after drilling. Companies use cement and steel casing to separate the wells from the aquifers, but Mr. Downs said casing can break or be improperly installed. As well, about 15 per cent of the fluids used in the fracturing process flow back out of the well. This waste water must be properly disposed of, but there have been several cases of contractors releasing it into streams.

Despite vocal opposition from some residents, the industry has allies among the farmers and landowners who can earn significant money when they lease their land for drilling.

Ashur Terwilliger is a beef farmer and head of the farm bureau in Chemung County, N.Y., just north of the Pennsylvania state line. He's no friend of the oil companies – in fact, he spends much of his time these days advising landowners how to avoid "getting screwed" by companies looking to lease their land – but he saves his most emphatic scorn for the environmentalists who are preventing cash-strapped New York landowners from profiting from the boom that is enriching their neighbours just a few kilometres down the road.

"I don't understand where these cockeyed environmentalists are coming from," said Mr. Terwilliger, suggesting there is opposition to every form of energy development, from rural wind farms to nuclear plants.

“I got people who would love to stay in farming but don’t know how the hell to do it. These lease payments could be their salvation.”

The New York regulator is promising to issue new rules by the end of the year, and companies are hoping that will open the door for drilling in the state, except in the watersheds of New York City and Syracuse, two cities that rely on untreated ground water.

Major international players, including Statoil, Mitsui & Co. Ltd. and Exxon Mobil Corp., are already making big bets on the Marcellus as well as other North American shale plays. Earlier this year Statoil boosted its Marcellus land holding by 10 per cent, after paying \$1.3-billion in 2008 for a 32.5 per cent interest in Chesapeake’s operations there. Statoil will also pay \$2.1-billion for development. The partners expect to drill up to 17,000 wells, primarily in Pennsylvania and New York, over the next 20 years.

But those ambitious plans will have to overcome the growing political opposition. Talisman provides an example of how energy companies are responding to government concern.

Talisman has its U.S. headquarters in Horseheads, a village near Elmira, N.Y. But despite its extensive land holdings in New York, Talisman is moving its 90-person office this summer to Pennsylvania, saying that state has become the hub of its Marcellus operations.

In Pennsylvania, the company is mindful that it has to court public opinion and has initiated a “Good Neighbor Policy.” That includes testing water wells that lay within 330 metres of a natural gas drill pad prior to commencing drilling.

Talisman also intends to recycle all its “flow back water” and use it to fracture other wells. The state regulator is urging other companies to adopt those “best practices.”

But ultimately, Talisman will only remain committed to Pennsylvania so long as the tax and regulatory regime remains attractive, Mr. Smith warned.

“At the early stage of development as momentum is still building, you can move capital from one play to another. And we’re unemotional as a company in terms of where we put our capital – we put our capital where we can earn the highest returns for our shareholders.”

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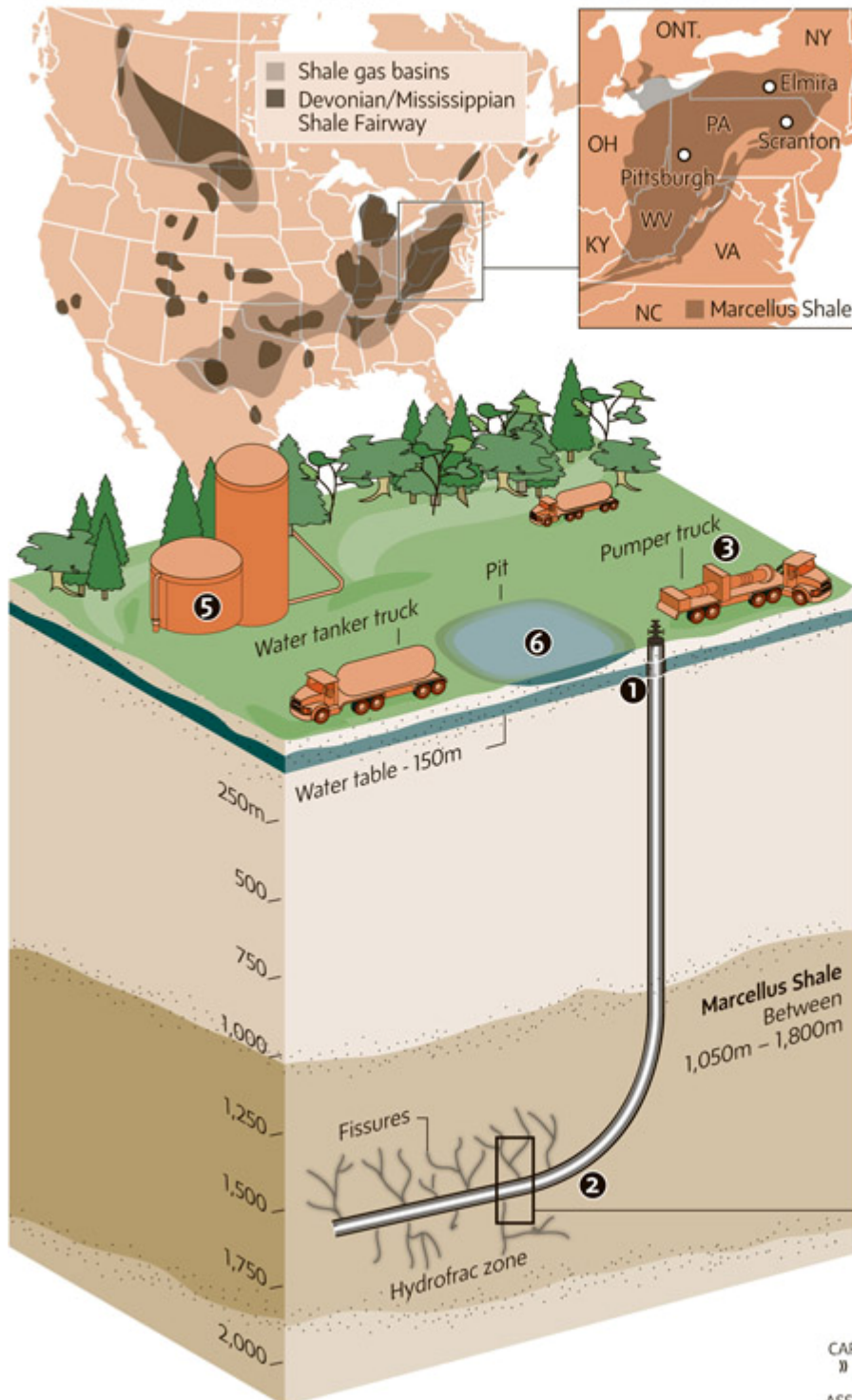
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## Shale gas redraws the energy map

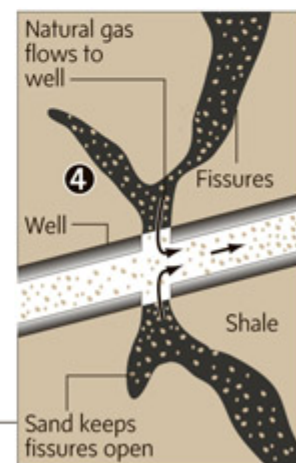
Natural gas can now be profitably recovered from dense shale rock that covers vast areas of North America. But breakthrough extraction technology that injects large quantities of water to crack the rock is raising fears about contamination of drinking water.

### SHALE GAS PLAYS OF NORTH AMERICA



### DRILLING FOR SHALE GAS

- 1 A well is drilled down to the shale layer.
- 2 It turns horizontally once at this layer.
- 3 Pumper truck injects water, sand and chemicals at high pressure through the well and into the shale, fracturing it.
- 4 The sand particles keep the fissures open so that the natural gas from the shale can flow up the well.
- 5 The natural gas is stored in tanks and then piped to market
- 6 Recovered water is stored in open pits and then taken to treatment plants



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